

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/17/10 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 6,9-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. In re claim 6 it recites "said first and second grooves" which lacks antecedent basis. For purpose of examination we understood the phrase as "said first and second groove portions". Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 3746

6. Claims 1-3,6-10 are rejected under 35 U.S.C 103(a) as being unpatentable over Katayama (Japanese patent publication number 2003065236) in view of Wantanabe (5076226).

7. In re claims 1 ,6 and 8 Katayama discloses a compression system including:

- A **hermetic compressor (figure 1)** storing oil in a hermetic container and accommodating a compression mechanism for compressing refrigerant gas, wherein the compression mechanism comprises: a crank shaft disposed in vertical direction, and having a **main shaft (9)** and an **eccentric shaft (10)** ,a block forming a **cylinder (13)** ,a **piston (23a)** making a reciprocating motion in the **cylinder (13)** , and having a top surface and a skirt surface, both vertical to a direction of the reciprocating motion, a **connecting rod (11)** for coupling the **eccentric shaft (10)** and the **piston (23)** , and an **oil supply system (7c)** for supplying the oil to an outer circumference of the piston (**see abstract**) , **grooves (23e)** are provided at an upper side and a lower side of the outer circumference of the piston, and of an outer shape of the grooves, the outer shape of the grooves communicating with a space in the hermetic container at least when the piston is in a bottom dead center is a shape not forming a parallel line to an axial center of the piston when the grooves are developed in a plane (**clearly shown in figure 5 and discussed in abstract**),wherein a **through-hole** is disposed at about the center of the grooves (**figure 5**). Katayama ,however fails to disclose the following details of the grooves as taught by Watanabe et al :

Art Unit: 3746

- The **outer shape of the grooves (28 and 328;figure 2,4,9)** is a **contiguous semicircular shape (column 3,lines 5-9;column 4,lines 6-18)** extending toward a skirt side of the piston, and the semicircular shape includes a first outer shape extending toward the skirt side of the piston, a second outer shape parallel to the top surface of the piston , and a third outer shape linking the first outer shape and the second outer shape, and a curvature of the first outer shape is smaller than that of the third outer shape **(figures 2,4,9 and 12 are different embodiments describing various shapes with different curvatures)** . It would have been obvious to one skilled in the art at the time the invention was made to modify the piston grooves of Katayama by making them in a contiguous semicircular fashion as taught by Watanabe et al to increase the area of lubrication. Please note that once modified the grooves of Katayama communicate with the space in the hermetic compressor.

8. In re claim 2 Katayama in view of Watanabe et al as applied to claim 1 discloses the claimed invention:

Katayama discloses:

- All of the outer shape of the grooves (23e) are shapes not forming the parallel line to the axial center of the piston when the grooves are developed in a plane, in figure 5.

9. In re claim 3 Katayama in view of Watanabe et al as applied to claim 1 disclosed the claimed invention but is silent as to how much the depth of the groove is. But It would have been obvious to one skilled in the art at the time the

Art Unit: 3746

invention was made to choose the proper dimension of the grooves since such choice merely depends on the size of the compressor ,the degree of lubrication required and the flow rate of the lubricant that the designer chooses.

10. In re claims 6 and 10 Katayama in view of Watanabe et al discloses the claimed invention:

Katayama discloses:

- A hermetic compressor ,in figure 1, storing oil in a hermetic container and accommodating a compression mechanism for compressing refrigerant gas, wherein the compression mechanism comprises: a crank shaft disposed in vertical direction, and having a main shaft (9) and an eccentric shaft (10) ,a block forming a cylinder ,a piston (23a) making a reciprocating motion in the cylinder (13) , and having a top surface and a skirt surface, both vertical to a direction of the reciprocating motion, a connecting rod (11) for coupling the eccentric shaft (10) and the piston (23), and an oil supply system (7c) for supplying the oil to an outer circumference of the piston (see abstract), grooves (23e) are provided at an upper side and a lower side of the outer circumference of the piston 10, wherein a through-hole is disposed at about the center of the grooves (figure 5).

Watanabe et al teach:

- The **grooves (28 and 328; figure 2,4,9)** include a first portion extending toward a skirt side and a second groove portion extending toward a top side of the piston ,**The first and second groove portions (28 and**

Art Unit: 3746

328;figure 2,4,9) having contiguous semicircular shape (column 3,lines 5-9;column 4,lines 6-18). Please note that once modified the grooves of Katayama communicate with the space in the hermetic compressor.

11. In re claims 7 and 9 Katayama in view of Watanabe et al discloses the claimed invention since Watanabe et al's various embodiments (such as figure 9) clearly disclose that the outer shape of the groove including the first outer shape, the second outer shape and the third outer shape is a curved shape to be gradually increase in sliding width toward the skirt direction of the piston.

12. Claim 5 is rejected under 35 U.S.C 103(a) as being unpatentable over Katayama (Japanese patent publication number 2003065236) in view of Wantanabe (5076226) as applied to claim 1 further in view of Irino (5092747).

13. In re claim 5 Katayama discloses the claimed invention but fails to teach a CFC-12 type of refrigerant . But Irino in paragraph 1,lines 32-34 teaches that hydrocarbon refrigerants are widely used in refrigerant compressor. It would have been obvious to one skilled in the art at the time the invention was made to choose a CFC-12 or other hydrocarbon as refrigerant since it is one of the most commonly used refrigerant in the field.

Response to Arguments

14. Applicant's arguments with respect to claims 1-3 and 5-10 have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 3746

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amene S. Bayou whose telephone number is 571-270-3214. The examiner can normally be reached on miff attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

/Amene S Bayou/

Examiner, Art Unit 3746